

CSE 412/598
Fall 2013
WinRDBI ASSIGNMENT #1
Relational Algebra

This is the first of three assignments that will allow you to execute query languages of the relational model. This first assignment focuses specifically on queries in relational algebra.

Important information about WinRDBI

There are two ways to access WinRDBI. The software is available at ASU's MyApps website. After logging into myapps.asu.edu, search for WinRDBI, and then follow the instructions. Another option is to download and install it to your machine. There is a .zip version available on Blackboard, under Assignments/WinRDBI folder. After downloading, visit <http://winrdbi.asu.edu/faqs.html>. Please report problems about WinRDBI to the TA at betul@asu.edu

Using the Music Rental Agency Enterprise on the following pages, you are to:

1. Load the music1.rdb file in WinRDBI. This data file is located in the folder for the first assignment on myASU.
2. Develop relational algebra solutions for the five queries specified in this assignment. **Comment the queries and use descriptive table and attribute names.**

See the resources below for additional information on WinRDBI:

1. The WinRDBI Web (<http://winrdbi.asu.edu/>) provides online demos and sample queries.
2. Understanding Relational Database Query Languages, S. W. Dietrich, Prentice Hall, 2001.

On the due date, you will turn in the following:

1. A hard copy of your query file (.alg), and a printout of the results of *ONLY* the 5 queries from WinRDBI. Make sure that the listing includes your name, the last 5 digits of your Affiliate ID, and class (CSE 412 or CSE 598) as a comment line in your .alg file.
2. An electronic copy of your query file must be turned in through the Assignment facility in the folder for the first assignment on BlackBoard. To avoid name clashes on files, rename your .alg file: **fname_lname_assignment1.txt**

To submit your file via myASU on the web, follow the directions given below:

- Log into the course site on myASU. **Make sure you log in as yourself.**
- Click on Submit Assignment under the folder for the first homework assignment.
- Follow the directions to submit your homework.
- *You can only submit your assignment once.*

Points will be deducted from your grade for failing to follow the above directions.
Late Assignments Will Not Be Accepted!

The assignment submission on myASU will be disabled at the start of class on the due date.
Solutions will be published in the WinRDBI Assignment Folder on the due date.

REMINDER: THIS IS AN INDIVIDUAL ASSIGNMENT!

Quality-Based Assessment

The following table is part of an approach to quality-based assessment of your homework assignment, itemizing the Expected/Required features of ALL WinRDBI homework assignments. Points will be deducted for each negative answer. Each query will also be rated for correctness and clarity.

YES	NO	EXPECTED/REQUIRED FEATURES
		The assignment was submitted electronically on myASU by the due date & time?
		The name appears as a comment line at the beginning of the query file?
		Hardcopy of queries and results submitted for assessment?
		Queries handed in are readable (not truncated)?
		All queries and variables have descriptive names?
		Queries are at least documented with the query statement and output schema?
		Tables representing identified query results are clearly indicated?
		Query results submitted for assessment were run against the published test data?

Test Data Disclaimer

We are providing you with an instance of the Music Agency Enterprise on which you can run your queries. The test data has been developed as a grading aid. The printed results that you submit must use the published test data. The goal of the test data is to provide a rich environment in which to test query solutions and to provide an initial metric for grading. **However, your query solutions will be graded on the correct logic – not the correct answer. Since the test data may not contain cases that illustrate every possible incorrect approach to answering a query, it may be possible for you to get the same result as our published solutions even when your logic is not correct.** Feel free to modify the test data for purposes of testing your solutions; however, *the printout of result data handed in for assessment must use the published test data.*

Problem Statement

Consider the following brief requirements of an application for a Music Rental Agency Database:

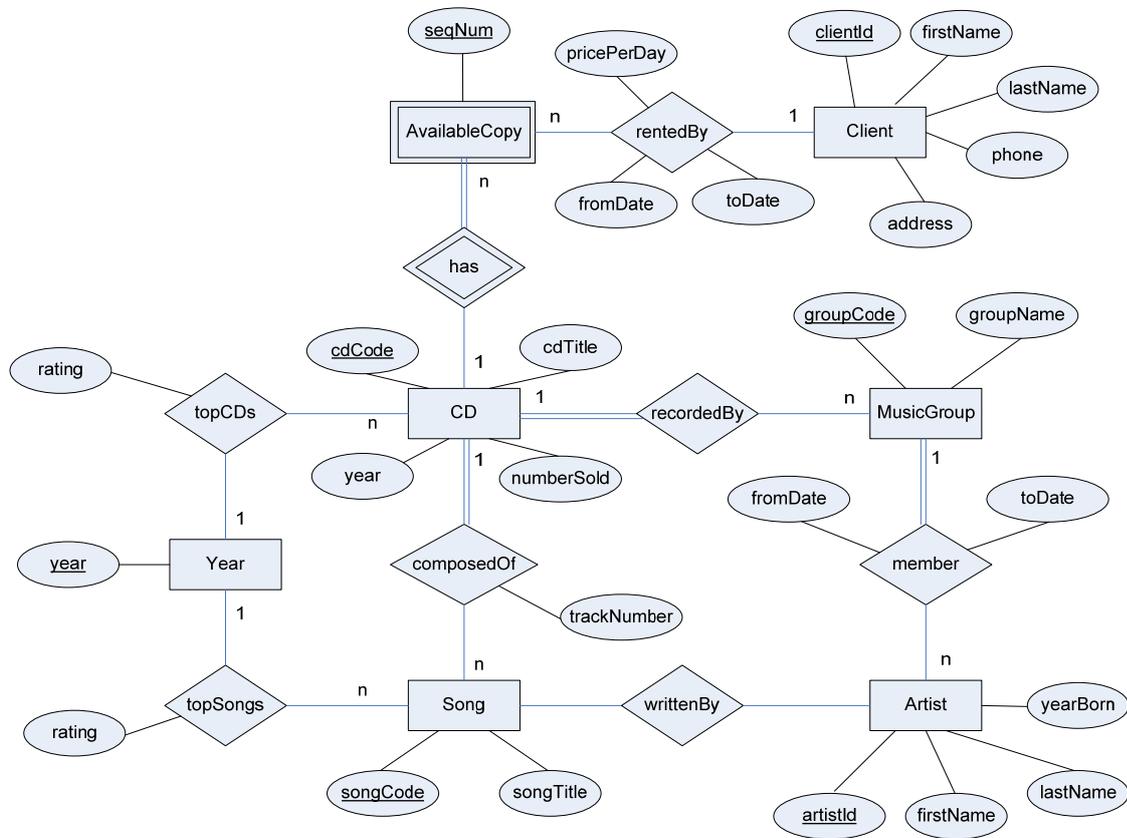
A music rental agency wants to keep track of CD-titles, the songs in each title, the musical group that recorded the CD, the artists that wrote the songs in the CD, and the ratings for each CD title and song title, the clients and rental information.

Each CD title consists of several songs, with a minimum of one song in each CD. Each song has a title and a unique code. The same song could also be present in multiple CD titles. Each song has a unique track number within a particular CD. For each year, the end-of-the-year rating (top 40) of each CD title and song title must be maintained. A CD can have multiple copies available for rental. Each copy must be associated with a CD with a sequence number.

A CD title is recorded by a single musical group, which has a name, and a unique code. A musical group may record several CD titles during its life span. The group consists of one or more artists, each of whom has a first name, last name and a unique id. The year in which the artist was born is also recorded. Since any artist may belong to multiple musical groups over time, the database must record the date when an artist joined a particular group and the date when he or she left the group. One or more artists write each song title on a CD. A single artist may contribute towards the writing of multiple song titles within a CD, but it isn't necessary for an artist to write a song.

A client has a first name, last name, phone number, address and a unique id. A client can rent multiple copies of CDs, and a copy of CD can only be rented by one client at a time.

ER Diagram for the Music Rental Agency Enterprise



The Music Rental Agency Database contains the following entities and relationships.

Entity Summary Table

Entity	Attribute	Type	Description
CD	cdCode	C	A code that uniquely identifies each CD.
	cdTitle	C	The title of the CD.
	numberSold	N	The number of CDs that have been sold.
	year	N	The year the CD is published.
AvailableCopy	cdCode	C	A code that uniquely identifies each CD.
	seqNum	N	A sequence number for a copy of CD.
Client	clientID	C	An ID that uniquely identifies a client.
	firstName	C	The first name of the client.
	lastName	C	The last name of the client.
	phone	C	The phone number of the client.
	address	C	The address of the client.
Song	songCode	C	A code that uniquely identifies each song.
	songTitle	C	The title of the song.
MusicalGroup	groupCode	C	A code that uniquely identifies a musical group.
	groupName	C	The name of the musical group.
Artist	artistID	C	An artist ID that uniquely identifies each artist instance in the music agency database.
	firstName	C	The first name of the artist.
	lastName	C	The last name of the artist.
	yearBorn	N	The year the artist was born.
Year	year	N	A valid year between 1900 and 2004.

Relationship Summary Table

Relationship	Attribute	Type	Description
Has			Each CD has one or more available copies, and each copy must be associated with one CD.
rentedBy			A client can rent one or more copies, and each copy can only be rented by one client at a time.
	fromDate	C	The start date of the rental.
	toDate	C	The end date of the rental.
	pricePerDay	N	The per day price for the rental.
composedOf			Each CD title consists of several songs, with a minimum of one song in each CD; the same song could also be present in multiple CD titles.
	trackNumber	N	Each song has a unique track number within a particular CD.
topCDs			For each year, the end-of-the-year rating (top 40) of each CD title must be maintained.
	rating	N	The CD rating. The top selling CD will have rating 1; the second rating 2; and so on.
topSongs			For each year, the end-of-the-year rating (top 40) of each song title must be maintained.
	rating	N	The song rating. The top selling CD will have rating 1; the second rating 2; and so on.
recordedBy			A CD title is recorded by a single musical group; a musical group may record several CD titles.
writtenBy			A song title is written by one or more artists; an artist can write multiple songs.
Member			A group consists of one or more artists; any artist may belong to multiple musical groups over time.
	fromDate	N	The date when an artist joined a particular group.
	toDate	N	The date when an artist left a particular group.

WinRDBI Music Agency Relational Database Schema

client(clientID, firstName, lastName, phone, address)

cd(cdCode, cdTitle, numberSold, year, groupCode)

availableCopy(cdCode, seqNum)

rentedBy(cdCode, seqNum, clientID, fromDate, endDate, pricePerDay)

song(songCode, songTitle)

musicalGroup(groupCode, groupName)

artist(artistID, firstName, lastName, yearBorn)

topCDs(cdCode, year, rating)

composedOf (cdCode, songCode, trackNumber)

topSongs(songCode, year, rating)

member(groupCode, artistID, fromDate, toDate)

writtenBy(songCode, artistID)

Summary of Primary and Foreign Keys

Relation	Primary Key	Foreign Key	References
Cd	cdCode	groupCode	musicalGroup.groupCode
availableCopy	cdCode, seqNum	cdCode	cd.cdCode
Client	clientID		
rentedBy	cdCode, seqNum, clientID, fromDate, toDate	cdCode, seqNum	availableCopy.cdCode, availableCopy.seqNum
		clientId	client.clientID
songTitle	songCode	-	-
musicalGroup	groupCode	-	-
Artist	artistID	-	-
topCDs	cdCode, year	cdCode	cd.cdCode
composedOf	cdCode, songTitle	cdCode	cd.cdCode
		songCode	song.songCode
topSongs	songCode, year	songCode	song.songCode

Member	groupCode, artistID, fromDate	groupCode	musicalGroup.groupCode
		artistID	artist.artistID
writtenBy	songCode, artistID	songCode	song.songCode
		artistID	artist.artistID

Queries

The output schema for the query is given in parentheses following the query specification.

1. List the CD title, the clients who have rented the CDs, and number of CDs sold for CDs with a top 5 rating ($1 \leq \text{topCDs.rating} \leq 5$) in 2003.
(cdCode, cdTitle, clientID, firstName, lastName, numberSold)
2. Which songs appeared on the best-selling (max number of CDs sold) CDs published in 2003?
(songCode, songTitle)
3. Find the list musical groups such that every client in Detroit rented at least one of their CD's.
(This is a division query).
(groupCode, groupName)
4. List names of artists that are song writers and have never had a song received a top 5 rating.
(artistID, firstName, lastName)
5. List the artists that have been a member of more than one group.
(artistID, firstName, lastName)